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**PAUL NEWMAN**  
**COMMISSIONER**

Direct Line: (602) 542-3699  
Fax: (602) 542-3708  
E-mail: [pnewman@azcc.gov](mailto:pnewman@azcc.gov)

**ARIZONA CORPORATION COMMISSION**

September 2, 2009

Steve Olea  
Director  
Utilities Division  
1200 W. Washington Street  
Phoenix, Arizona 85007

Dear Mr. Olea:

This letter is to comment on the proposed draft Integrated Resource Plan (IRP) rules that will amend Title XIV of the Arizona Administrative Code.<sup>1</sup>

First of all, I want to thank the Commission staff, Chairman Mayes and Commissioner Pierce for their diligent work on these rules. I realize that dozens of meetings and many hundreds of hours of work and research went into drafting these rules. I can appreciate the fact that Chairman Mayes and staff both want this process to wrap up as quickly as possible to finish this process, which began years ago.

However, I also believe strongly that we are at a crossroads in electrical generation, and that we should take the extra time to look into these common-sense additions to the IRP rules. Chairman Mayes made the important point in staff meeting today that we should not let "the perfect be the enemy of the good." I could not agree more. But the opportunity we have to craft more forward-thinking rules and I believe we should seize the day.

The additions to the rules are detailed below, and include:

1. A requirement to evaluate each type of electrical generation in terms of "life-cycle" analysis. For each type of generation, this means considering both costs and emissions for (a) production and transportation (b) water use and water pollution (c) air pollution and a range of costs for health effects from air pollution;
2. Analyzing future fuel supplies for coal and natural gas every three years; and
3. A ten-year rather than fifteen-year planning horizon.

I believe that we can address these issues in a way that does not add to staff's work load. There are a number of **experts** who would be happy to help us with these issues free of charge.

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<sup>1</sup> Title XIV Public Service Corporations, Corporations and Associations, Securities Regulation, Chapter 2 Corporation Commission Fixed Utilities, Article 7. Resource Planning

I also believe that we should **give the public 45 days to comment** and actively solicit input by making a simple email address available just for IRP comments.

Following are the rule changes that refer to specific sections of the draft rules; followed by a detailed analysis and supporting documentation on why these changes are important and necessary.

## **I. Rule Changes In Chronological Order**

### **Proposed Changes to R14-2-701 Definitions**

- 1) **R14-2-701 Definitions** - see new number 18 (replacing existing number 18 “escalation” added definition for “environmental externalities,”<sup>2</sup> and states that if an exact monetized value cannot be agreed upon, a range of costs may be used. A 1994 study by NREL<sup>3</sup> discusses other approaches such as weighting or ranking, cost of control or percentage adders.
- 2) **R14-2-701 Definitions – addition to number 42 “sensitivity analysis.”** Please add the following: “Sensitivity analysis shall include a range of values for the discount rate, a range of values for environmental externalities, a range of values for future water costs and a range of values for future fossil fuel costs.”
- 3) **R14-2-701 Definitions – addition to definition of “total cost.”** Please add “and environmental externalities” following the phrase “adverse environmental effects” and prior to the word “incurred.”

### **Proposed Changes to R14-2-703 Utility Load-serving entity reporting requirements.**

- 4) Please make the following additions to B.1. be adding new subsections **h, i, and j**:
  - h. Fuel supply study for coal, natural gas and uranium every five years, starting 2010.
  - i. Estimated v. actual costs for natural gas and coal for the past five year; and estimated costs for natural gas and coal for the next 30 years;
  - j. Estimated annual increase in cost of natural gas and coal for the next 30 years;

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<sup>2</sup> “Environmental Externalities” – means currently uncounted costs including water use water use and water contamination; coal ash (bottom and fly) storage, monitoring and disposal; health effects from burning coal; and emissions from transportation and production of fuels. If an exact monetized value cannot be determined, a range of costs may be used.

<sup>3</sup> *Issues and Methods in Incorporating Environmental Externalities into the Integrated Resource Planning Proces*, by Jeffery M. Fang and Paul S. Galen, November 1994, NREL/TP-461-6684

- 5) Please add to the current **section B.1.h** "Other variable operating and maintenance costs for generating units, in dollars per megawatt hour" the words "with fuel costs broken out."
- 6) Please add to the current **section B.1** a new subsection m: "Costs for sorbents and other chemicals used in pollution control devices."
- 7) Please add to the current **section B.1** a new subsection r: "Estimated amount of coal ash produced by each power plant, location for disposal, and governing regulations."
- 8) Change all references to require a ten-year rather than a fifteen-year forecast; changes to be made to: **Section C.1, Section D.1, D.2, D.4, D.6, and D.13.**
- 9) Add back in **section C.2**, which states "Hourly demand forecasts for 10 years, if requested by staff."
- 10) Add back in **Section C.3**, which states "If requested by staff, data used in the analysis."
- 11) Add to the first paragraph in **Section D**, after the words "environmental impacts" and before the words "and water consumption" the phrase "environmental externalities and life-cycle costs."
- 12) Add to **Section D.9**, after the phrase "A calculation of the benefits of generation using renewable energy resources;" the words "including environmental benefits from reduced water, reduced pollution, reduced fossil fuel wastes such as coal ash, reduced transportation and production emissions."
- 13) Add to **Section E.1.a** after the phrase "Demand forecast" the words "including the effects of hotter temperatures and higher peak demands as projected by the latest government climate change research;"
- 14) Add to **Section E.1.f** after the phrase "Changes in fuel prices, and availability," the words "and a comparison of estimated v. actual fuel costs."
- 15) Do not delete **Section E.2**, subsections a through d, and add a new subsection e to read "Consider the benefits of hybridizing existing power plants."

**Proposed Changes to R14-2-704. Commission review of load-serving entity resource plans**

- 16) New **Section B** (formerly **Section C**) that starts with "By July 1 of each odd year, the Commission shall determine whether to issue an order acknowledging the resource plans." In **Section B.6** after the phrase "The reliability of the transmission grid," add the phrase, "taking consideration future increases in temperature."

## II. Background Information on Proposed Rule Changes

This section is meant to give some background to the proposed changes, in response to objections from staff and other Commissioners that the changes:

- are too difficult to quantify, and
- will take too much staff time and effort to accomplish.

There are many experts willing to consult with us at no cost to the taxpayer. Some experts are available to meet with Commissioners and staff in person, while others can meet via conference call. I am happy to provide a more complete list of potential experts, who include the Regulatory Assistance Project [www.raponline.org](http://www.raponline.org) – retired former regulators, paid by grants or the U.S. government who do not have a vested interest in the outcome; and the National Renewable Energy Lab.

The changes I've proposed fall into three general categories:

- 1) Life-cycle analysis, including externalities
- 2) Fuel supply analysis, and a
- 3) Ten-year rather than fifteen-year planning horizon.

Each is described in detail below.

### 1. Life-Cycle Analysis Including Externalities

The National Renewable Energy Lab (NREL) is a research arm of the U.S. Department of Energy, and specializes in life-cycle analyses, which it defines as: a systematic, cradle-to-grave process that evaluates the environmental impacts of products, processes, and services.<sup>4</sup>

NREL set up a Life Cycle Inventory (LCI) database to carefully evaluate the cradle-to-grave impacts of everything from windows to power plants. Experts and topics include such as *Life Cycle Assessment of a Natural Gas Combined-Cycle Power Generation System*,<sup>5</sup> biomass,<sup>6</sup> solar PV,<sup>7</sup> and coal.<sup>8</sup>

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<sup>4</sup> See NREL LCI web page: <http://www.nrel.gov/lci/assessments.html> (accessed 9/01/09)

<sup>5</sup> *Life Cycle Assessment of a Natural Gas Combined-Cycle Power Generation System*, by Pamela Spath and Margaret K. Mann, September 2000, NREL/TP-570-27715; See page 15 of the document for a clear graphic which shows that 25% of the greenhouse emissions from a natural gas combined-cycle plant come from production and transportation – a significant amount. <http://www.nrel.gov/docs/fy00osti/27715.pdf>

<sup>6</sup> See NREL web page: [http://www.nrel.gov/analysis/tech\\_bio\\_analysis.html](http://www.nrel.gov/analysis/tech_bio_analysis.html) (accessed 9/01/09)

<sup>7</sup> This study is a life-cycle analysis of solar PV at Tucson Electric Power's PV plant in Springerville, *Life Cycle Analysis of a Field, Grid-Connected, Multi-Crystalline PV Plant: A Case Study of Tucson Electric Power's Springerville PV Plant*, Final Report Prepared for Tom Hansen, Tucson Electric Power November 5, 2004, by James Mason, Ph.D., Solar Hydrogen Education Project.

A two-page summary of NREL's energy and electricity database, from expertise on national and regional grids to state- and power plant-specific data; production and transportation data; and pre-and-post-combustion emissions data can be found here:  
[http://www.nrel.gov/lci/pdfs/no2\\_energy\\_tptd\\_bse.pdf](http://www.nrel.gov/lci/pdfs/no2_energy_tptd_bse.pdf)

### *Environmental Externalities*

There are many scientifically sound, peer-reviewed studies that have quantified externalities such as health effects and lost work days. Many studies have looked extensively at the health costs of coal combustion in terms of the number of heart attacks, asthma hospitalizations and missed school days. The Environmental Protection Agency (EPA) regularly reports on the environmental effects of rules in and monetizes these public health effects.<sup>9</sup>

There are dozens of similar government and non-profit groups with of studies providing a range of monetized values. A comprehensive study was completed by the Energy Information Administration in 1995 that summarized studies around the U.S.<sup>10</sup>

An interesting study was commissioned by the Ontario Ministry of Energy. The Ontario government owned *both* a coal plant and a hospital, and wanted to see how much the coal plant was costing at the hospital. The study showed that while the Ontario Power Authority was selling coal-fired power wholesale for 3 cents per kilowatt-hour (kWh), the health costs were triple that amount – over 9 cents/kWh.<sup>11</sup> The study looked at

### *Coal Ash Costs and Potential Liability*

On December 22, 2008, one billion gallons of coal ash was spilled adjacent to the Kingston coal plant in Harriman, TN, owned and operated by the Tennessee Valley Authority (TVA). Three hundred acres were flooded when a coal ash pond collapsed, destroying homes and property and poisoning surrounding water and wildlife. According to the TVA's Office of the Inspector General's June 23, 2009 Inspection Report, (Inspection 2007-11399), cleaning up

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<sup>8</sup> See Life Cycle Assessment of Coal-Fired Power Production, by Pamela Spath, Margaret K. Mann and Dawn R. Kerr, June 1999, NREL/TP-570-25119, at: <http://www.nrel.gov/docs/fy99osti/25119.pdf>

<sup>9</sup> For example, see *Reducing Power Plant Emissions for Cleaner Air, Healthier People and a Strong America*, Office of Air and Radiation, March 2005; reporting, for example, that this rule would provide \$85-\$100 billion in health benefits each year by 2015, preventing 17,000 premature deaths, 22,000 non-fatal heart attacks, 12,300 hospital admissions, 1.7 million lost work days and 500,000 lost school days:  
[http://www.epa.gov/CAIR/charts\\_files/cair\\_final\\_presentation.pdf](http://www.epa.gov/CAIR/charts_files/cair_final_presentation.pdf)

<sup>10</sup> See *Electricity Generation and Externalities: Case Studies*, September 1995, Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels, Coal and Electric Analysis Branch, DOE/EIA-0598, located at: [http://www.osti.gov/bridge/product.biblio.jsp?osti\\_id=108206](http://www.osti.gov/bridge/product.biblio.jsp?osti_id=108206)

<sup>11</sup> See *Executive Summary, Cost-Benefit Analysis: Replacing Ontario's Coal-Fired Electricity Generation*, prepared for the Ontario Ministry of Energy by DSS Management Consultants Inc. and RWDI Air Inc., April 2005:  
<http://www.energy.gov.on.ca/english/pdf/electricity/Cost%20Benefit%20Analysis%20DSS%20Report%20-%20Executive%20Summary.pdf>

this spill will exert significant financial pressure on TVA. Initial clean-up costs are estimated at \$675 to \$975 million, and may reach as high as \$1.2 billion.

The TVA spill highlighted the fact that there are hundreds of coal ash impoundments around the U.S., and on March 9, the EPA sent letters to hundreds of U.S. power plants requesting information about coal ash surface impoundments. The EPA letter, which at: <http://www.epa.gov/osw/nonhaz/industrial/special/fossil/breen-facility.pdf>

The EPA determined that Arizona has 9 of 44 of the most hazardous coal ash sites in the U.S., many of them in rural Cochise County. I believe that we have an obligation as responsible regulators to know exactly what the risks are in these coal ash ponds both in terms of public health and utilities' financial exposure to potential liability.

#### *The Costs of Mercury Contamination*

Methyl mercury is a development neurotoxicant – meaning that it kills brain cells. Exposure results primarily from consumption by pregnant women of seafood contaminated by mercury from anthropogenic sources; with power plants accounting for 42% of mercury emissions nationally.<sup>12</sup> In Minnesota, power plants account for 50% of mercury emissions, and the legislature took the lead in requiring the three largest coal plants in the state to reduce mercury emissions 90% by 2014, ahead of the federal schedule for mercury reduction.<sup>13</sup>

The state of Minnesota estimated mercury damage costs ranging from \$1,429 to \$4,359 per pound of mercury.<sup>14</sup> The Minnesota Center for Environmental Advocacy (MCEA) released a study in June 2006 that quantified environmental-related childhood disease.<sup>15</sup> The study uses data from studies by Kate Davies for Washington state and states:

*“These cost estimates are very conservative, so the impacts on individuals, society and taxpayers are likely much greater. This information has value for public policy because it requires we account for long-term costs to society, a perspective too often left out of policy analyses. Since environmental contributors to childhood diseases are largely preventable, public policies that prevent exposures and pollution provide significant benefits for individuals and for society. We recommend the implementation of policies to reduce or eliminate some of the key environmental*

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<sup>12</sup> *Id.*, p. 13.

<sup>13</sup> *Id.*, p. 13.

<sup>14</sup> Attached are relevant pages of the entire study, pages 78-79. These three pages, including the cover page, are at the end of Attachment A.

<sup>15</sup> *The Price of Pollution: Cost Estimates of Environment-Related Childhood Disease in Minnesota*, Minnesota Center for Environmental Advocacy, June 2006. [www.mncenter.org](http://www.mncenter.org)

contributors to childhood illnesses in Minnesota, such as: *phasing out remaining products with mercury...*" (emphasis added)<sup>16</sup>

The study points out that we have a moral obligation to protect our children from preventable disease, and that it makes good economic sense as well.<sup>17</sup>

The enormous economic costs from environmental pollution include not only health care, but cancer treatments, lost productivity, and estimates are:

- certain childhood environmental diseases cost the U.S. as a whole an estimated \$54.9 billion/year in 1997 dollars;
- Washington state estimated environmental diseases cost \$1.875 billion;
- Massachusetts estimated \$1.6 billion for childhood diseases; and
- Montana, which included adults, estimated \$404.6 million/year.<sup>18</sup>

Finally, a report issued this month by the U.S. Department of Interior and conducted by the United States Geological Survey reported that every fish tested in 291 streams contained mercury.<sup>19</sup> One quarter of the fish had mercury levels above the safety limit set by the EPA.

#### *Water Use by Power Plants*

According to the U.S. Geological Survey (U.S.G.S.), thermoelectric power uses 48% of all U.S. water withdrawals,<sup>20</sup> nearly as much water as irrigation.<sup>21</sup> The average person in the U.S. uses:

- 100 gallons/day for direct water use (bathing, laundry, lawns),
- 510 gallons/day for food production (irrigation and livestock), and
- 465 gallons per day for electricity.<sup>22</sup>

## 2. Fuel Supply Studies

The cost of fossil fuels has seen increasing volatility since 2000. From 1980 to 2000, the increase in the cost of fossil fuels was generally slow and steady. However, since 2000 – and especially since 2005 – the costs coal, natural gas and uranium have had wide swings.

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<sup>16</sup> *The Price of Pollution: Cost Estimates of Environment-Related Childhood Disease in Minnesota*, Minnesota Center for Environmental Advocacy, June 2006, p. 3.

<sup>17</sup> *Id.*, p. 3.

<sup>18</sup> *Id.*, p. 4, citing other studies too numerous to list.

<sup>19</sup> [http://www.nytimes.com/2009/08/20/science/earth/20brfs-MERCURYFOUND\\_BRF.html?\\_r=1](http://www.nytimes.com/2009/08/20/science/earth/20brfs-MERCURYFOUND_BRF.html?_r=1)

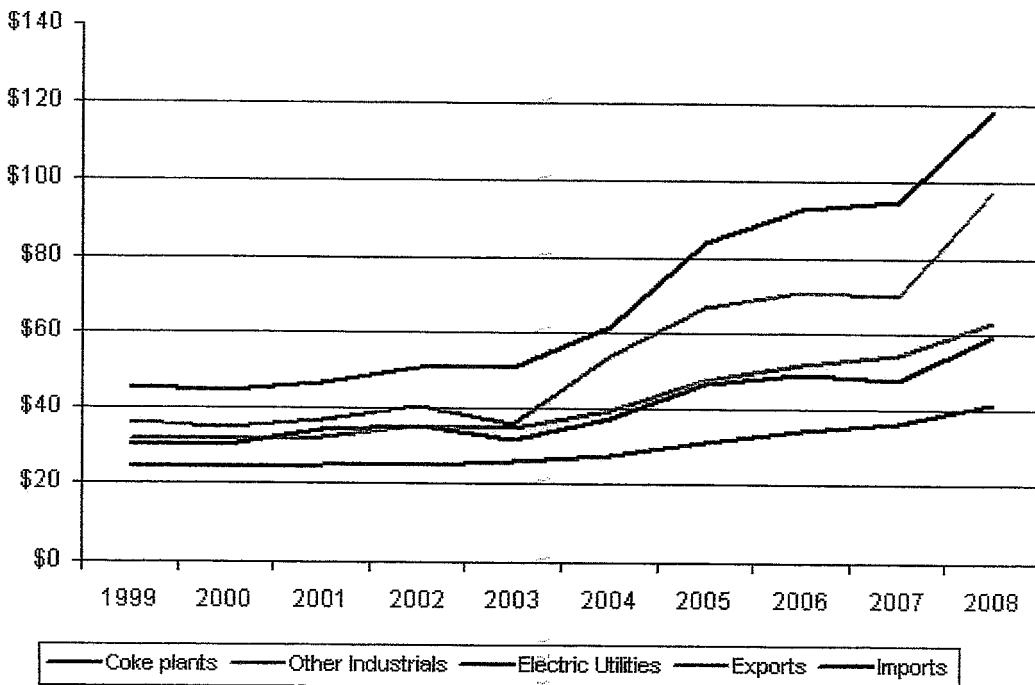
<sup>20</sup> See *USGS Circular 1268*, 15 figures, 14 tables (released March 2004 and revised April and May 2004), at: <http://water.usgs.gov/pubs/circ/2004/circ1268/index.html>

<sup>21</sup> *Id.*

<sup>22</sup> See *The Wind/Water Nexus*, U.S. Department of Energy, Wind Powering America Fact Sheet, DOE/GO-102006-2218, April 2006, p. 2

Arizona is currently benefitting from low natural gas prices. But with over 30% of our generation from natural gas, and nearly all of our natural gas imported from out of state, we are vulnerable to future fuel increases.

The cost of coal has increased 1998 to 2009, according to the U.S. Department of Energy's Energy Information Administration (EIA).<sup>23</sup>



The simple truth is that it's better to be over-prepared in our business than under-prepared. Prudence requires that if a utility wishes to build a coal, natural gas or nuclear project, it must have a ready supply of fuel. As demand for fossil fuel grows around the country and around the world, we can expect the price to rise.

### 3. Ten-year v. Fifteen-year Planning Horizon

For many of the same reasons given above, prudence requires that we look at a shorter planning horizon. Technology is changing quickly, and federal laws that would put a price on carbon will affect power plant economics. We must be flexible and a 10-year planning horizon provides this needed elasticity.

<sup>23</sup> <http://www.eia.doe.gov/cneaf/coal/page/special/fig7.html>



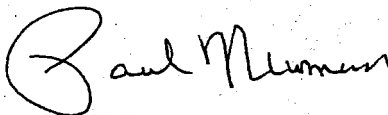
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### III. Conclusion

For the reasons outlined above, I hope that the Commission and staff will seriously consider these rule changes. Again, I believe these changes will benefit the citizens and ratepayers of Arizona, and represent a new way of looking at the costs and benefits of different types of electrical generation. Only when we consider *all* the costs and benefits will we make apples-to-apples comparisons.

Please do not hesitate to call me to discuss.

Sincerely,

A handwritten signature in black ink, appearing to read "Paul Newman". The signature is fluid and cursive, with a large initial "P" and "N".

Paul Newman  
Commissioner

cc: Ernest G. Johnson, Executive Director  
Chairman Kristin K. Mayes  
Commissioner Gary Pierce  
Commissioner Sandra D. Kennedy  
Commissioner Bob Stump